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ABSTRACT

Described is an evaluation instrument designed for individual or group use for assessing an overall science curricula. Specific items within seven broad topics (foundations for local planning; curriculum; teaching-learning; staff; facilities, equipment, and materials; evaluation; and finances) are scaled zero (totally lacking) to four (excellent). The scale for each topic is averaged and plotted on an included profile chart. Also included is a Plan of Action form for planning science curriculum improvement based upon the areas of strength and need identified on the profile chart. (SL)

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SCIENCE EDUCATION
ASSESSMENT INSTRUMENT

Division of Science Education
State Department of Public Instruction
Raleigh, N. C. 27611

SCIENCE EDUCATION, K-12

This instrument is designed to assist teachers and others in local administrative units in assessing science curricula in regard to the needs and aspirations of their students. It may be used by an individual or by a group. The science curriculum consists of those courses and activities designed to meet the individual student's educational needs related to science.

The instrument is composed of seven categories and a summary section. The purpose of the summary section is to provide a means for looking, in a graphic manner, at the results obtained from the instrument after it has been completed, and for planning for program improvement.

Directions

Familiarize yourself with the format of this instrument. Then rate each item using the following scale:

0 1 2 3 4

Circle the number (only one) which identifies your evaluation of the item. The scale extends upward from 0 to 4 (0 = totally lacking; 1 = poor; 2 = fair; 3 = good; 4 = excellent).

After completing the instrument, add all circled numbers in each category and obtain an average for each category. The averages are to be used in completing the profile chart on page 10.

Name of School _____

Administrative Unit _____

Grade Level(s) _____ Assessment Date _____

Note: If a more comprehensive assessment instrument is desired, contact the National Science Teachers Association, 1742 Connecticut Avenue, N. W., Washington, D. C. 20009.

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I. FOUNDATIONS FOR LOCAL PLANNING

To What Degree:

- | | |
|--|-----------|
| 1. has a local science advisory committee been established? | 0 1 2 3 4 |
| 2. have such representatives of the local community as scientists, engineers, school and lay personnel been involved--to the extent of action--on the local advisory committee? | 0 1 2 3 4 |
| 3. has a survey or a listing been made of local science-related resources available for improving science teaching? | 0 1 2 3 4 |
| 4. have resources of local business and industry been utilized, e. g., field trips, classroom presentations, and science materials? | 0 1 2 3 4 |
| 5. are scientists and science educators from nearby colleges and universities used as consultants and speakers for the school's science program? | 0 1 2 3 4 |
| 6. are measurements made of factors such as changes in enrollment and interest in science classes and activities which might be significant in planning for facilities, staff, budget, and curriculum? | 0 1 2 3 4 |
| 7. is there coordination to insure that the following are being adequately included in the science program and, at the same time, are not being duplicated: | |
| a. environmental education? | 0 1 2 3 4 |
| b. metrification? | 0 1 2 3 4 |
| c. safety? | 0 1 2 3 4 |
| 8. is there evidence that attention is being given to coordinating and infusing the science program with the mathematics, English, social studies, and other programs? | 0 1 2 3 4 |
| 9. has an effort been made to develop adjunct science activities within the community such as a junior museum, nature trail, or wildlife preserve? | 0 1 2 3 4 |
| 10. are efforts made to follow up progressing science students to determine whether or not the sequencing and content of the science program is meeting the students' needs? | 0 1 2 3 4 |
| 11. have the local board of education and the school administration evidenced a sensitivity for the responsibility for public education in science through: | |
| a. making plans to adequately finance a good program? | 0 1 2 3 4 |
| b. recognizing that specific facilities and equipment, as well as properly trained science teachers, are a basic requisite to a good program? | 0 1 2 3 4 |
| c. providing an opportunity for every child to study science at every grade level? | 0 1 2 3 4 |
| d. supporting thoughtfully-conceived curriculum and instructional innovations? | 0 1 2 3 4 |

- | | |
|---|-----------|
| 12. has an operating philosophy for the science program been developed? | 0 1 2 3 4 |
| 13. are the long-range goals for the science program used in determining short-range immediate objectives? | 0 1 2 3 4 |
| 14. is there evidence that the long-range goals consider the nature and importance of the history, philosophy, and lives of men of science as a major cultural influence? | 0 1 2 3 4 |

Determine the average (to one decimal point) for category I by dividing the total of the circled numbers in category I by 19.

(Total _____; Average _____)

II. CURRICULUM

To What Degree:

- | | |
|--|-----------|
| 1. have criteria, based on long-range goals, been established for the selection and organization of course content? | 0 1 2 3 4 |
| 2. is science scheduled as a regular subject and available to each pupil at every grade level? | 0 1 2 3 4 |
| 3. is the amount of class time scheduled for science at every grade level sufficient for the full attainment of the desired goals? | 0 1 2 3 4 |
| 4. are open-ended and problem-solving type activities used extensively as a means of developing: | |
| a. scientific attitudes? | 0 1 2 3 4 |
| b. skills in the processes of scientific inquiry? | 0 1 2 3 4 |
| c. functional understandings of scientific concepts? | 0 1 2 3 4 |
| 5. do the curricula at your grade level (primary, middle, or secondary) give emphasis to the historical, biographical (men of science), and philosophical aspects of science? | 0 1 2 3 4 |
| 6. does the school science program provide opportunities, encouragement, and assistance for interested, qualified students to do individual or specialized work in science? | 0 1 2 3 4 |
| 7. does the science program provide encouragement and assistance for students to engage in a variety of special activities such as science clubs, fairs, contests, and the junior academy program? | 0 1 2 3 4 |
| 8. is the science program supported by appropriate modifications and arrangements of the instructional activities of the science faculty such as: | |
| a. open classroom concept? | 0 1 2 3 4 |
| b. flexible scheduling concept? | 0 1 2 3 4 |

- | | |
|--|-----------|
| c. differentiated staffing? | 0 1 2 3 4 |
| d. team teaching? | 0 1 2 3 4 |
| 9. is the content and nature of specific science courses influenced by national curriculum development projects which have been carried on during the past 10-15 years? | 0 1 2 3 4 |
| 10. does the science program development give consideration to recommendations from a K-12 curriculum committee for the school district? | 0 1 2 3 4 |
| 11. do teachers participate in developing the science curriculum? | 0 1 2 3 4 |
| 12. is there articulation between and among elementary, junior high, and high school science courses? | 0 1 2 3 4 |
| 13. does the content of offerings meet the science needs of students relative to their becoming "scientifically literate?" | 0 1 2 3 4 |
| 14. do the offerings and strategies used encourage the student to understand the nature of science as inquiry as well as a structural body of knowledge? | 0 1 2 3 4 |
| 15. is laboratory work included as an integral part of the science program? | 0 1 2 3 4 |
| 16. is the science curriculum reviewed annually for changes and modifications? | 0 1 2 3 4 |
| 17. are student surveys used to get suggestions for evaluating and strengthening the science program? | 0 1 2 3 4 |
| 18. does the science program help students develop and practice using attitudes and habits essential to critical thinking; e.g., curiosity, suspending judgment, testing the accuracy of data, evaluating and using sources of data and information? | 0 1 2 3 4 |

Determine the average (to one decimal point) for category II by dividing the total of the circled numbers in category II by 23.

(Total _____; Average _____)

III. TEACHING-LEARNING

- | | |
|---|-----------|
| 1. To what extent does instruction promote the use of inquiry in problem-solving situations? | 0 1 2 3 4 |
| 2. To what degree do classroom procedures reflect the objectives of the course? | 0 1 2 3 4 |
| 3. To what extent are different methods of instruction offered for slow, average, and able students? | 0 1 2 3 4 |
| 4. To what degree is there evidence that the teachers adequately plan and prepare for instruction? | 0 1 2 3 4 |
| 5. To what degree is there evidence that the school or administrative unit is attempting to identify problems in science instruction and to seek their solutions? | 0 1 2 3 4 |

6. When teaching assignments are made, to what degree is consideration given to factors such as:
- a. content background of teachers? 0 1 2 3 4
 - b. teaching experience? 0 1 2 3 4
 - c. preference of teachers? 0 1 2 3 4
 - d. number of preparations? 0 1 2 3 4
7. To what degree do science teachers' schedules include adequate time to make preparations for laboratory work and demonstrations as well as to prepare for classroom teaching? 0 1 2 3 4
8. To what extent does the professional library include a good selection of professional books, periodicals, and newsletters, or other current releases of information relating to science teaching? 0 1 2 3 4
9. To what degree is adequate secretarial and clerical help (nonstudent) available to the science teachers? 0 1 2 3 4
10. To what extent does the administration seek and work to provide working conditions that foster excellence in the teaching and learning of science? 0 1 2 3 4
11. To what degree is there evidence that the students are developing skills in the use of apparatus and equipment? 0 1 2 3 4
12. To what extent do tests and examinations place emphasis on learning scientific concepts or "big ideas" in science? 0 1 2 3 4
13. To what degree is there evidence that the nature and importance of scientific attitudes and values are discussed in the classroom? 0 1 2 3 4
14. To what extent is the relation of science and technology to current problems of people and society discussed in the classroom? 0 1 2 3 4
15. To what extent does the study of science offer students opportunities to learn about careers in science and in science-related fields, what they are like, how to prepare for, and what to expect from these careers? 0 1 2 3 4
16. To what extent are pupils encouraged to question evidence, challenge loose thinking, and develop hypotheses as an accepted part of classroom behavior? 0 1 2 3 4
17. To what extent are pupils encouraged to develop investigations on their own? 0 1 2 3 4
18. To what degree does studying science help students improve their communication skills through activities such as listening, reading, writing, and observing? 0 1 2 3 4
19. To what degree is there evidence that the administration recognizes that:
- a. good science teaching requires more in the way of specific facilities and equipment than other academic areas? 0 1 2 3 4

- b. science classes should not be scheduled in regular or standard classrooms? 0 1 2 3 4
20. To what degree are regular staff meetings held to discuss the problems of operation and improvement of science learning? 0 1 2 3 4

Determine the average (to one decimal point) for category III by dividing the total of the circled numbers in category III by 24.

(Total _____; Average _____)

IV. STAFF

1. How adequate do you feel is the professional preparation of the staff with regard to subject matter? 0 1 2 3 4
2. How adequate do you feel is the preparation of the staff in learning theory and in up-to-date methods of teaching science? 0 1 2 3 4
3. To what extent have members of the science staff participated in courses, seminars, and workshops dealing with recent developments in science and science education? 0 1 2 3 4
4. To what extent do science staff members attend professional meetings? 0 1 2 3 4
5. To what extent does the school administration contribute to the professional improvement of its teachers? 0 1 2 3 4
6. To what degree are all science teachers properly certified for their assignments? 0 1 2 3 4
7. To what degree have the science teachers updated their education through summer or academic year science programs within the last five years? 0 1 2 3 4
8. To what degree do the science teachers belong to professional science organizations? 0 1 2 3 4
9. To what degree do the science teachers hold membership in the state organization for science teachers? 0 1 2 3 4
10. To what degree do science teachers work with other science staff members to effectively coordinate teaching/learning activities? 0 1 2 3 4
11. To what degree do science teachers assume professional responsibilities for career guidance of pupil's interests in science? 0 1 2 3 4
12. How adequate is the board of education's and the administration's policies for frequently reviewing teacher assignments in terms of academic and other qualifications? 0 1 2 3 4
13. To what degree are teachers on all grade levels encouraged to experiment with new content and new techniques? 0 1 2 3 4
14. To what degree are science teachers given release time for in-service education? 0 1 2 3 4

- | | |
|---|-----------|
| 15. To what degree does the administrative unit have sufficient qualified science supervisory personnel? | 0 1 2 3 4 |
| 16. Is there a designated leader (teacher as chairman, head, etc.) for the science program? (Circle 4 if answer is yes; 0 if no.) | 0 1 2 3 4 |

Determine the average (to one decimal point) for category IV by dividing the total of the circled numbers in category IV by 16.

(Total _____; Average _____)

V. FACILITIES, EQUIPMENT, AND MATERIALS

1. Rate rooms where science is taught relative to the following characteristics:

- | | |
|---|-----------|
| a. proper heat and ventilation (including fume hoods where needed)? | 0 1 2 3 4 |
| b. electrical outlets where needed? | 0 1 2 3 4 |
| c. running water taps and sinks where needed? | 0 1 2 3 4 |
| d. room darkening capability? | 0 1 2 3 4 |
| e. adequate facilities for large and small group instruction and independent study? | 0 1 2 3 4 |
| f. adequate space, tools, and materials for building and maintaining equipment? | 0 1 2 3 4 |
| g. adequate space and equipment for maintaining living plants and animals where needed? | 0 1 2 3 4 |
| h. adequate space for storing equipment and materials? | 0 1 2 3 4 |
| i. adequate provisions for the safe storage and handling of hazardous materials? | 0 1 2 3 4 |
| j. adequate space for student project work? | 0 1 2 3 4 |
| k. readily accessible first aid and safety equipment? | 0 1 2 3 4 |
| l. adequate facilities and directions for disposal of waste material? | 0 1 2 3 4 |

2. To what degree are suitable types of basic equipment and instructional aids provided for and readily available to:

- | | |
|---|-----------|
| a. teachers for instructional purposes? | 0 1 2 3 4 |
| b. pupils for project work? | 0 1 2 3 4 |
| c. pupils for team work? | 0 1 2 3 4 |
| d. pupils for individual work, both during and outside of classroom time? | 0 1 2 3 4 |

3. To what degree are adequate quantities of the following provided:

- | | |
|---|-----------|
| a. textbooks with recent copyright dates? | 0 1 2 3 4 |
|---|-----------|

- | | |
|---|-----------|
| b. science periodicals for teachers? | 0 1 2 3 4 |
| c. science periodicals for pupils? | 0 1 2 3 4 |
| d. science reference books for teachers? | 0 1 2 3 4 |
| e. science reference books for pupils? | 0 1 2 3 4 |
| f. professional science journals? | 0 1 2 3 4 |
| 4. To what degree is the library equipped with materials for allowing comprehensive study in the science program? | 0 1 2 3 4 |
| 5. To what degree does each science teacher have facilities for effective performance of: | |
| a. preparatory and planning activities? | 0 1 2 3 4 |
| b. confidential conference activities with pupils and parents? | 0 1 2 3 4 |
| c. desk and office functions? | 0 1 2 3 4 |
| 6. To what extent are teachers responsible for the selection of equipment, materials, and texts? | 0 1 2 3 4 |
| 7. To what extent are items of audiovisual equipment available for immediate use as necessary? | 0 1 2 3 4 |
| 8. To what extent are teachers instructed in the use of equipment and materials? | 0 1 2 3 4 |
| 9. To what extent are the materials, equipment, and services in the science rooms kept in good working order? | 0 1 2 3 4 |
| 10. To what extent are the classrooms and laboratories adequate in number and size for the number of students who take science? | 0 1 2 3 4 |
| 11. If there is an outdoor nature study area available on or near the school grounds, to what extent is it used for teaching/learning purposes? | 0 1 2 3 4 |
| 12. To what extent are procedures for requesting and ordering equipment and supplies reasonable, simple, and efficient? | 0 1 2 3 4 |
| 13. To what extent are science teachers effectively involved in the selection and purchase of all instruction, equipment, and materials for use in the science areas? | 0 1 2 3 4 |
| 14. To what extent is an effective, continuous inventory of science equipment and supplies maintained? | 0 1 2 3 4 |
| 15. To what degree are duplicating facilities and other reproduction services available to science teachers? | 0 1 2 3 4 |

Determine the average (to one decimal point) for category V by dividing the total of the circled numbers in category V by 36.

(Total _____; Average _____)

VI. EVALUATION

1. To what degree does the teacher evaluation program make use of a variety of techniques and instruments such as the following:
 - a. anecdotal records? 0 1 2 3 4
 - b. nonwritten performance tests? 0 1 2 3 4
 - c. objective tests? 0 1 2 3 4
 - d. essay examinations? 0 1 2 3 4
 - e. teacher observations? 0 1 2 3 4
2. To what degree does the evaluation program reflect balanced emphasis among conceptual schemes, process skills, social aspects of science, and values and attitudes? 0 1 2 3 4
3. To what degree are criteria for evaluation available which are based on the stated goals for the science program? 0 1 2 3 4
4. To what degree have science teachers received in-service or other training regarding evaluation and evaluation measures? 0 1 2 3 4
5. To what extent are efforts made to follow up the graduates from high school programs to determine whether or not the science program met the needs of:
 - a. those who plan to follow careers in science? 0 1 2 3 4
 - b. those who do not plan to pursue science-related careers but who will become scientifically-literate citizens? 0 1 2 3 4
6. To what extent are teachers encouraged and given the opportunity to evaluate their own teaching procedures? 0 1 2 3 4
7. To what degree do science tests assess more than the recall of facts in that they include evaluations of applications of principles, comprehension, synthesis, judgment, and understanding the processes of science? 0 1 2 3 4
8. To what extent are the results of evaluation used in guiding students in their selection of more advanced courses and life careers? 0 1 2 3 4
9. To what extent do students exhibit an interest in science as shown by their leisure-time activities? 0 1 2 3 4
10. To what extent is evaluation of student achievement made in terms of success in meeting specified objectives? 0 1 2 3 4
11. To what degree is communication of student achievement by teachers to parents done periodically by means other than the issuance of "report cards," with single letter marks or grades for the course? 0 1 2 3 4

12. To what extent is the evaluation of the appropriateness and effectiveness of the science program used as a means of keeping up-to-date a continuing activity in science program development?

0 1 2 3 4

Determine the average (to one decimal point) for category VI by dividing the total of the circled number , category VI by 17.

(Total _____; Average _____)

VII. FINANCES

1. To what degree are budgetary provisions made so that items may be ordered during the school year for new projects, for perishable materials, and for unforeseen contingencies?
2. To what extent is the budget realistic and adequate for the science program?
3. To what extent does the school provide money and/or leave for professional travel for science teachers?
4. To what extent are funds and support provided to call in consultants and specialists needed to help the science teachers?

0 1 2 3 4

0 1 2 3 4

0 1 2 3 4

0 1 2 3 4

Determine the average (to one decimal point) for category VII by dividing the total of the circled numbers in category VII by 4.

(Total _____; Average _____)

SUMMARY SECTION

Transfer the category averages from the previous pages to the appropriate blanks below.

<u>Categories</u>	<u>Averages</u>
I. FOUNDATIONS FOR LOCAL PLANNING	_____
II. CURRICULUM	_____
III. TEACHING-LEARNING	_____
IV. STAFF	_____
V. FACILITIES, EQUIPMENT, AND MATERIALS	_____
VI. EVALUATION	_____
VII. FINANCES	_____

Profile Chart

Darken each column from the bottom up to the level which indicates the average obtained for that category.

SCALE	CATEGORIES						
	4	3	2	1	0	I. FOUNDATIONS...	II. CURRICULUM
						III. TEACH.-LEARN.	IV. STAFF
						V. FACILITIES...	VI. EVALUATION
						VII. FINANCES	

This profile chart, when completed, should provide assistance in planning for science curriculum improvement. The areas of strength and areas of need will be easily identifiable.

Plan Of Action

I. Areas of strength:

II. Areas in need of improvement (in rank order):

III. Strategies necessary for improving science program:

IV. Immediate plans:

V. Long-range plans: